



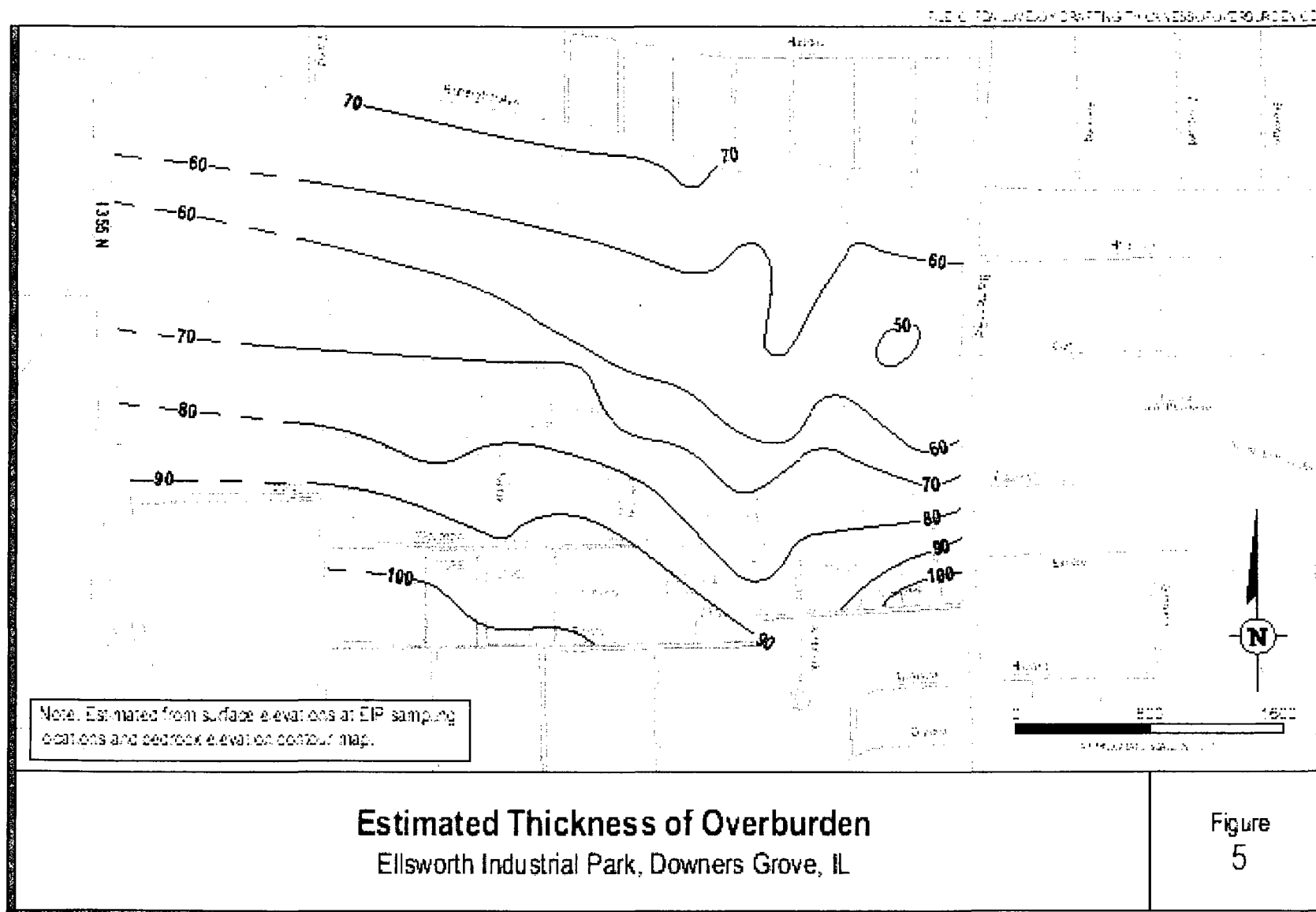
Agenda

EPA/Weston/Lovejoy Meeting

May 8, 2009

- Introductions
- Goal – Identify a site specific rationale that will allow Lovejoy to address onsite contamination and minimize exposure to acceptable risk.
- Area geology is of two types – along St. Joseph's Creek – shallow bedrock & alluvial aquifer water tables coupled with permeable soil types vs. southwest side of EIP – deep bedrock aquifer, no alluvial, and relatively impermeable soil types.
- Driscoll's modeling
- RI findings at LJ support the modeling output, i.e., TCE contamination is contained onsite
- Discuss potential remedial action approaches using a workable set of objectives

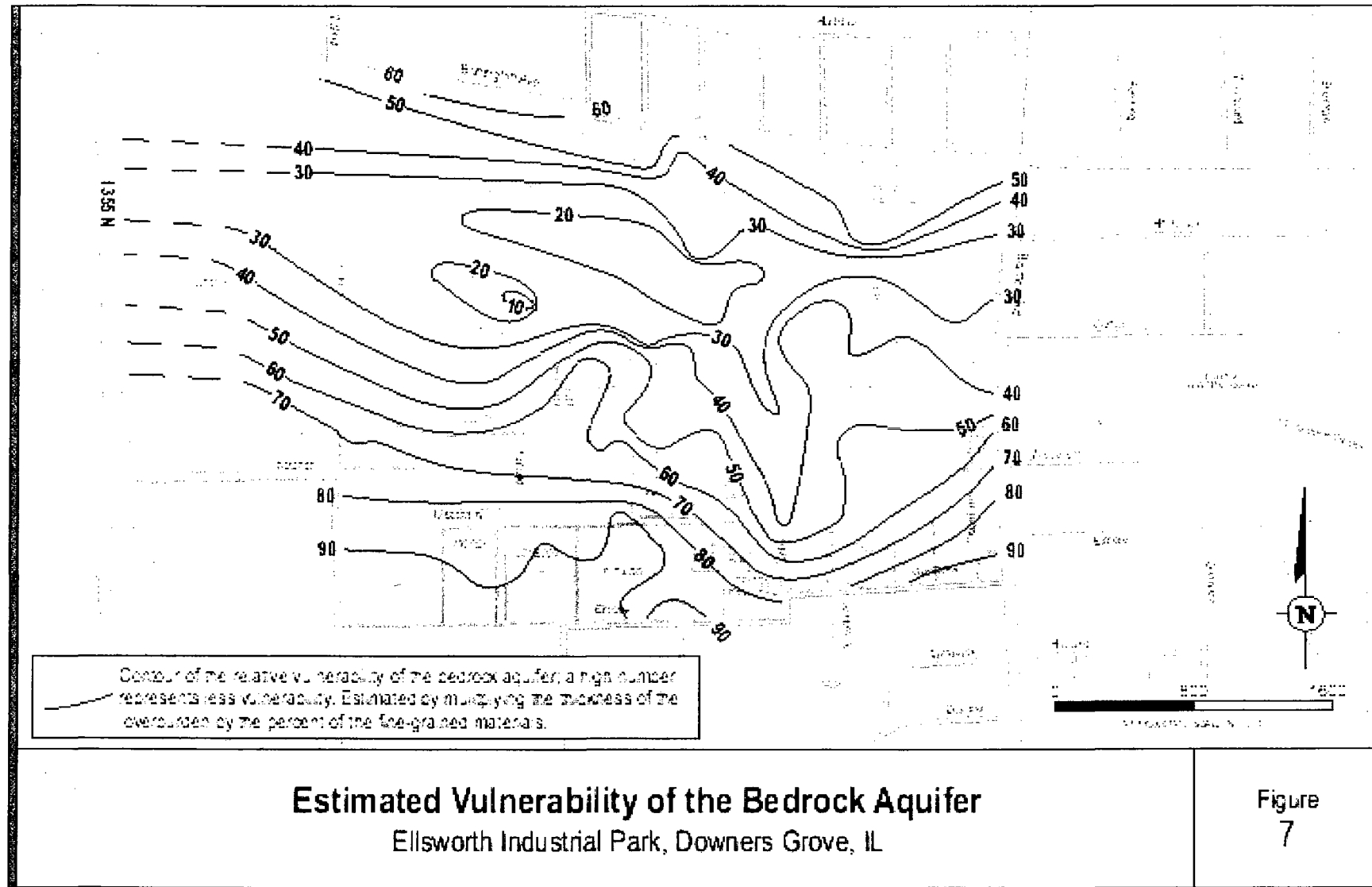
Thickness of Overburden



Thickness of Overburden at LJ Prevents Migration

- Two primary geologic units underlie the Lovejoy Property and play a role in the occurrence and movement of groundwater.' The upper-most bedrock unit, a Paleozoic dolomite rock, is overlain by two types of glacial materials: clayey, silty till and outwash sands and gravels.
- The glacial deposits beneath the Lovejoy Property are 90 to 100 feet thick. Most of these sediments consist of the Wadsworth Till, although it is possible that the till is underlain by a sand (outwash plain) layer which lies on the Silurian rock. The estimated thickness of the till formation is at least 65 to 80 feet; only three or four thin sand lenses have been identified in the till itself near the Lovejoy Property. Driscoll's figure mirrors the data present in Figure 3-2 of the RI.
- Below a depth of about 23 feet, an additional thickness of at least 43 feet of low-permeability clay till exists (see boring log for SS262D). Thus, it appears that at Lovejoy and other locations in the southern portion of the Ellsworth Industrial Park, a significant thickness of low-permeability till (without any significant fractures) exists

Vulnerability



Fletcher Dickell & Associates LLC

Bedrock Aquifer Vulnerability Assessment

- The alluvial (aka intermediate) aquifer exists in the sand and gravel deposits that parallel St. Joseph Creek. The EPA has assigned the term 'intermediate' aquifer zone to this occurrence of groundwater in order to distinguish it from the bedrock aquifer below as well as the somewhat higher perched groundwater that is found in some areas, such as beneath Lovejoy. The intermediate aquifer is limited to the lateral extent of these sand and gravel deposits and has not been identified in the clayey, silty till deposits found farther to the north and south in the Ellsworth Industrial Park area. {See Figure 6-25, location & extent of alluvial aquifer impacts)
- Driscoll evaluated the depth from ground surface to bedrock; the amount and thickness of till; and the amount and thickness of coarse grained sands and gravel to determine where the bedrock aquifer is vulnerable to contamination.
- The vulnerability map shows that the areas where infiltration is most likely to reach the bedrock aquifer are located in the vicinity of St Joseph Creek, and that the lowest vulnerability occurs in the southern portion of the Industrial Park, including the Lovejoy Property.
- In general, the bedrock aquifer hydraulic gradient is south-southeast. The Lovejoy property is upgradient of this flow path.

The map shows a complex street layout with various buildings and landmarks. Key features include:

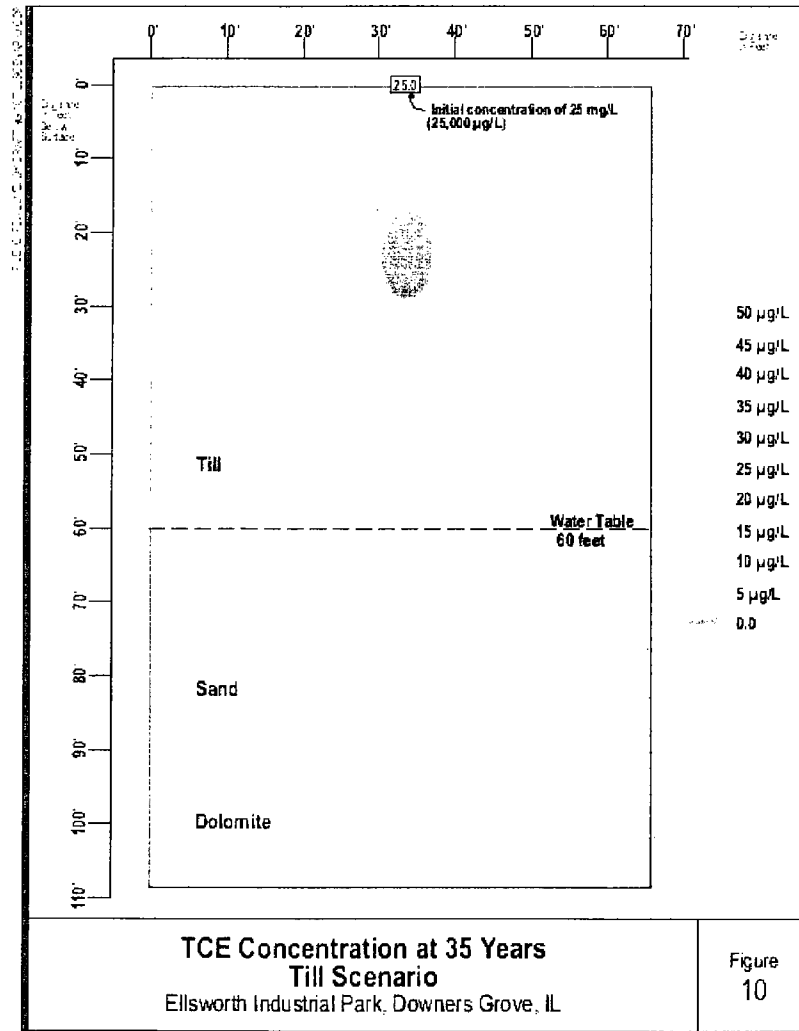
- Section A:** Located at the top center, containing a building labeled 'LP-401'.
- Section B:** Located at the top right, containing a building labeled 'LP-401'.
- Section C:** Located in the middle right, containing a building labeled 'LP-401'.
- Section D:** Located in the bottom center, containing a building labeled 'LP-401'.
- Section E:** Located in the middle center, containing a building labeled 'LP-401'.
- Section F:** Located in the bottom left, containing a building labeled 'LP-401'.
- Section G:** Located in the middle left, containing a building labeled 'LP-401'.
- Section H:** Located on the far left, containing a building labeled 'LP-401'.
- Section I:** Located in the middle left, containing a building labeled 'LP-401'.
- Section J:** Located in the middle right, containing a building labeled 'LP-401'.
- Section K:** Located on the far right, containing a building labeled 'LP-401'.

A solid line with a circle at its end points to a specific location labeled 'Lovejoy'.

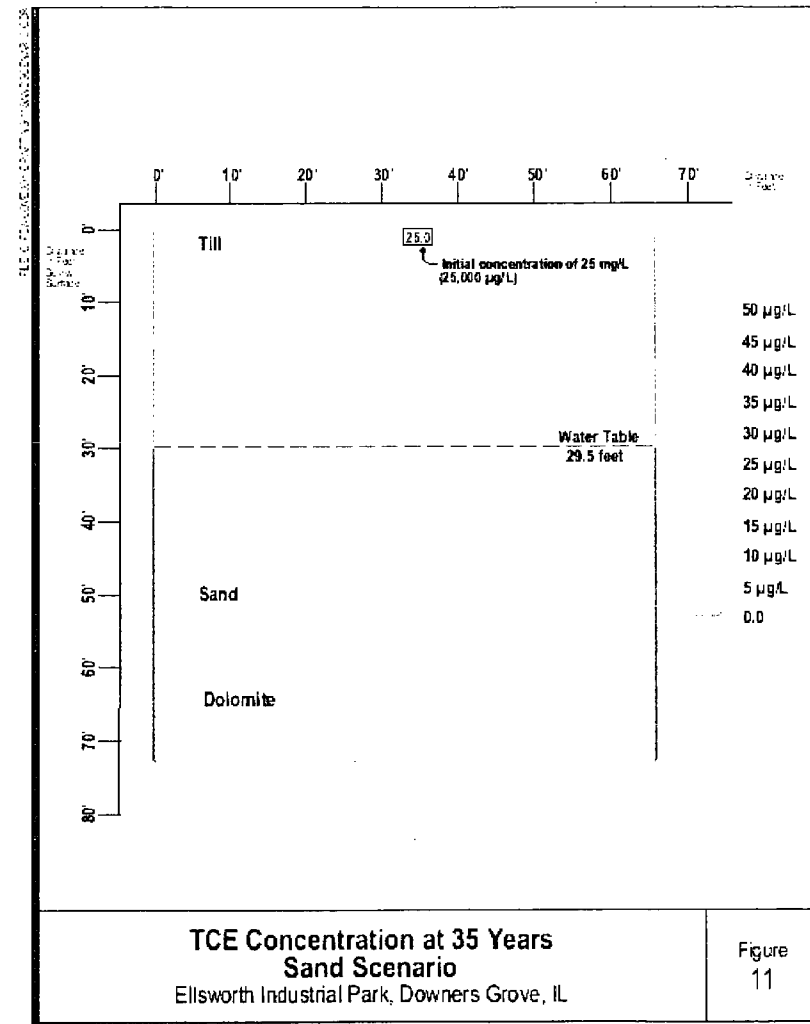
Modeling Contaminant Migration

- Fletcher Driscoll & Associates constructed two vadose zone models to compare the movement of chlorinated volatile organic chemicals (VOCs) through a cross section of sand to their movement through glacial till.
- The VS2DT computer program was used – VS2DT was developed by the U.S. Geological Survey for solving primarily two-dimensional problems of water flow and solute transport in variably saturated porous media.
- The general layout of the model conditions for the 'till scenario' represents a thick till unit comparable to that found near the southern boundary of the Industrial Park.
- The model layout for the 'sand scenario' represents a sand unit underlying a 5-foot till layer, similar to the conditions found in the Industrial Park along St. Joseph Creek.
- An initial soil-water TCE concentration of 25,000 $\mu\text{g/L}$ was assigned to a simulated source area 5 feet wide by 1 foot deep in each model.
- Infiltration is assumed to occur only six months each year. Each scenario is run to portray conditions at the end of 35 years.

Driscoll Modeling Results



Fletcher Driscoll & Associates, LLC

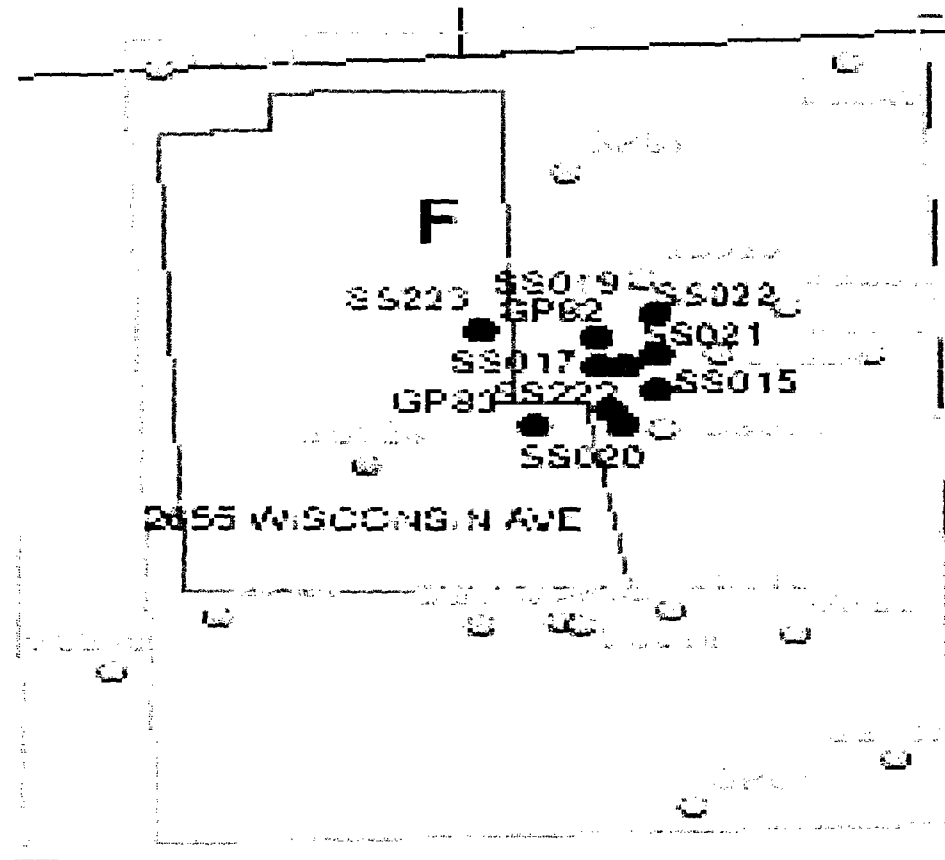


Fletcher Driscoll & Associates, LLC

Driscoll Results

- {Figure 10} For properties like Lovejoy - the till scenario – After 35 years, the TCE concentration of 5 µg/L is estimated to be at a depth of 33 feet below ground. The maximum TCE concentration remaining in soil water at the end of the simulation is about 150 mg/L at about 23 feet below ground surface (bgs). TCE does not reach the bedrock aquifer in the till simulation.
- {Figure 11} For the sand scenario, TCE concentrations reach the water table in less than six years. No TCE remains in soil water at the end of the simulation, but a maximum concentration of 74 ug/L occurs just below the water table.
- Although the modeling results are general in nature, they do indicate the substantial difference between VOC transport in hydro-geologic settings similar to those found at different locations in the Park. Where till is thin or not present at all, and sand dominates the sediments above the water table, VOCs may reach groundwater quickly, but leave low residual concentrations in soil and soil water. Where thick glacial till occurs above the water table VOCs may not reach the water table at all, even though residual soil and soil water concentrations may be higher than those observed in sand.

Figure 6-10e – Estimated Impact Area; Soil > Draft SSL (TCE)



Soil Investigations at Lovejoy

- The clay layer till appears to begin at depths 11 ft (SS239) to @ 20 ft (SS262). Bedrock begins at approx. 95 ft (SS262). At location SS262D, the clay till begins at about 5 ft and extends to at least 66 ft.
- Soil results indicate that TCE is primary COC detected. The horizontal limits of impact begin beneath the building along the eastern side and extend approximately 100 ft east. Lateral impacts have remained onsite – see perimeter sample results.
- Contamination found under building and along eastern side. Source likely originated nearly 40 years ago – prior owner, Harper Wyman Co. operated a degreaser.

Groundwater Investigations at Lovejoy

- SWBZ - With the exception of the grab water samples collected from borings next to the building (in areas of impact) only MW239 showed evidence of TCE contamination, 7.7 µg/L. Depth to water at MW239 was 3.43 ft. Depth to SWBZ shows that the shallow water bearing zone is located 3.43 ft to 13.87 ft below grade.
- Alluvial – Not Present
- Bedrock – Onsite - No contaminants were detected at concentrations above analytical detection limits from a groundwater sample from the bedrock aquifer (MW262D).
- Bedrock – Offsite - No evidence of impact of TCE in OU2 along projected groundwater flow path (south-southwest) in vicinity of Lovejoy. See Weston Exhibit.

TCE Groundwater Results 2001 & 2002 Studies



Note: Results based on 2001 & 2002 studies only. 2003/2004 data not incorporated at this

Soil Screening Levels/Approach

- SSL's should be based on an accurate site model that identifies exposure routes. At Lovejoy, the following routes are complete – industrial/commercial ingestion, industrial/commercial inhalation, construction worker ingestion & inhalation, and soil component of the SWBZ. These soil-based SSLs are only applicable in the unsaturated zone – as such, site cleanup of soils would be limited to 3.5 to 14 ft below grade.
- The Soil component of the bedrock groundwater ingestion route is incomplete – migration from shallow soils to bedrock aquifer is not predicted. Migration from impacted areas on site to property perimeter has not occurred to date, after many years. Migration from impacted areas on site to OU2 has not occurred to date.
- The groundwater ingestion pathway is incomplete. There is no exposure to shallow groundwater – it is not a potable water supply. In Illinois, the SWBZ at Lovejoy would be considered Class 2 groundwater per 35 IAC 620. TCE has a Class 2 objective of 25 µg/L. None of the SWBZ wells onsite had TCE results > 25 µg/L.

Discussion of RA Alternatives

- Potential remedial alternatives will be discussed by the group.